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A RESEARCH PROGRAM TO DETERMINE THE EFFECTS OF VARIOUS PRESCHOOL INTERVENTION PROGRAMS ON THE DEVELOPMENT OF DISADVANTAGED CHILDREN AND THE STRATEGIC AGE FOR SUCH INTERVENTION.

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THIS DOCUMENT EXAMINES 3 METHODS OF PRESCHOOL INTERVENTION, (1) HOME TUTORING SERVICES, (2) HOME TRAINING OF THE INFANT BY THE MOTHER, AND (3) CLASSROOM (NURSERY. SCHOOL) INTERVENTION. THE RESULTS OF PROVIDING 1 YEAR OF TUTORING IN THE HOME OF DISADVANTAGED CHILDREN WAS ENCOURAGING. THE TUTORED AND NONTUTORED CHILDREN WERE COMPARABLE ON THE CATTELL AS A PRETEST, BUT THE TUTORED CHILDREN PERFORMED HIGHER THAN THE NONTUTORED ON 31 OF 33 VARIABLES OF THE STANFORD-BINET AS A POSTTEST. THE SECOND METHOD OF INTERVENTION FOCUSED ON INSTRUCTING MOTHERS IN WAYS OF STIMULATING THE INTELLECTUAL AND LANGUAGE DEVELOPMENT OF THEIR CHILDREN. THESE CHILDREN SCORED GAINS ON BOTH THE STANFORD-BINET AND ITPA OVER THOSE OF THE CONTROL CHILDREN WHOSE MOTHERS DID NOT PARTICIPATE IN THE PROGRAM. THE THIRD METHOD INVOLVED COMPARING 5 TYPES OF 1-YEAR PRESCHOOL INTERNVENTION PROGRAMS. THE RESULTS OF MEASURES OF PERFORMANCE OF CHILDREN IN THESE 5 PROGRAMS INDICATED THAT THE MORE HIGHLY STRUCTURED PROGRAMS WERE MORE EFFECTIVE AS SHOWN BY SCORES ON THE STANFORD-BINET AND ITPA. PART OF THIS STUDY WAS EXTENDED INTO A SECOND YEAR IN WHICH CHILDREN FROM 2 OF THE 3 MOST EFFECTIVE PROGRAMS OF THE 5 PROGRAM STUDY WENT ON TO KINDERGARTEN AND THE CHILDREN OF THE THIRD EFFECTIVE PROGRAM REMAINED IN THAT INTERVENTION PROGRAM. THE RESULTS OF SCORES OF THESE 3 GROUPS INDICATE THAT PERHAPS GAINS MADE DURING A YEAR OF NURSERY SCHOOL ARE NOT MAINTAINED WITHOUT FURTHER SPECIAL INTERVENTION. THIS PAPER WAS PRESENTED AT THE AMERICAN EDUCATIONAL RESEARCH ASSOCIATION (CHICAGO, FEBRUARY 10, 1968). (WD)

A Research Program to Determine the Effects of Various Preschool Intervention Programs on the Development of Disadvantaged Children and the Strategic Age for Such Intervention

Presented at the Convention of the
American Educational Research Association
Conrad Hilton Hotel
February 10, 1968

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In the fall of 1965 the Institute for Research on Exceptional Children, College of Education, at the University of Illinois with supporting funds from the Bureau of Research of the U.S. Office of Education initiated a research program on preschool disadvantaged children. The research generally falls into two major categories: (1) Basic sociological research conducted by Bernard Farber and Michael Lewis, sociologists, focusing on social variables in lower class families which effect intellectual and educational development and (2) the development and testing of various curricular interventions for the disadvantaged preschool child from ages 8 months through 5 years conducted by Samuel A. Kirk, Carl Bereiter and Siegfried Engelmann, and Merle Karnes. Essentially, the research has attempted to answer three major questions:

1. At what age is intervention most effective?
2. What kind of intervention is most effective?
3. How long should special intervention be continued?

Although all of the studies are longitudinal and the true test of the effectiveness of any program rests on how well these children function in subsequent years, analysis of interim data gathered in the first two years of the research program throws substantial light on the questions posed.

Research on Infants

Kirk's project which includes fifteen experimental children ranging in ages from 8 months to 2 years comprises the youngest subjects included in this research program. His objectives are to determine whether these children, provided with a tutorial program of intellectual stimulation and language development in their homes for one hour a day, five days a week, will reach a level of cognitive and language development at the age of 4 years which will exceed that attained (1) by their older, untutored siblings when they were 4 years of age and (2) by a control group who received no treatment.

Genevieve Painter, for her doctoral dissertation, analyzed data on twenty of these young subjects after the experimental subjects had completed one year of tutorial sessions. Although the ten experimental and the ten control subjects were comparable on pretest measures, the experimental subjects performed higher on thirty-one of the thirty-three variables tested on test 2. These differences reached significance at the .05 level on nine of these variables. On the Stanford-Binet Intelligence Scale the experimental subjects were significantly superior following treatment to their counterparts who received no educational intervention. It can be noted in Figure I that the posttest mean IQ of the experimental subjects was 108.1 and that of the control subjects was 98.8. These IQ gains are not remarkable when compared to those made by three- and four-year-old children from the same population in experimental classes. It may be that disadvantaged infants are not unlike middle class infants in intellectual functioning and that before age three marked differences have not yet emerged. This is in keeping with Hunt's thinking about critical ages for intervention.

The unpublished, revised Illinois Test of Psycholinguistics was administered to these subjects. The performance of the experimental subjects exceeded

that of the control group on all subtests except Visual Closure; however, the differences reached statistical significance on only the Auditory-Vocal Association subtest. These findings are presented in Figure II.

The conclusions that can be drawn from these data must be tentative but suggest that the intellectual and language development of disadvantaged infants can be accelerated through a tutorial program in the home. Further data will be obtained when the experimental subjects who are now in a preschool class reach the age of 4 and their performance can be compared with that of their older siblings who had no tutorial sessions or preschool experience before the age of 4 and with that of the control children at the age of 4.

Under Karnes' direction a program was launched in the fall of 1967 which posed the same questions as the Kirk infant study but focused on instructing 20 mothers to stimulate the intellectual and language development of their infants. These data will be compared with the data on the Kirk infants who were tutored by teachers in the home and with a comparable group of control children whose mothers were not provided with a training program. This approach was patterned after an earlier study conducted by Karnes in the spring of 1966.

In the 1966 study thirty Negro 3- and 4-year-old children from an economically depressed neighborhood served as subjects. These subjects were matched on intelligence and sex and were randomly assigned to an experimental or a control group. None of the children attended a preschool. The mothers of the experimental children attended eleven weekly, two-hour sessions in a neighborhood elementary school at which time they made educational materials to use during the following week in teaching their children at home. Inexpensive materials found in the home or which were

readily available to parents were used. In addition books and puzzles were available for the mothers to take home for use with their children during the week. A discussion of appropriate ways to use these materials at home was an integral part of each work period. All activities stressed language development of the children. The control mothers received no training.

The results of the study presented in Table I indicate that during the eleven-week period the experimental subjects made significantly greater gains in intellectual ability as measured by the Stanford-Binet Individual Intelligence Scale. The experimental subjects evidenced a mean gain of 7.5 IQ points, while the mean gain for the control group was 0.

The experimental edition of the Illinois Test of Psycholinguistic Abilities was administered to the subjects to assess their progress in language development. One might expect the children during the three-month testing interval to have increased their language age three months. Table II shows that in only one instance (Motor Encoding) did the experimental subjects fail to progress in accordance with the interval expectancy; in eight instances they exceeded this expectancy. The controls failed to reach interval expectancy on five subtests and met or exceeded it on four. A comparison of total language age scores indicated that the language development of the control children met the interval expectancy while that of the experimental children doubled the interval expectancy. One might conclude from these data that a program which trained mothers to use educational materials at home to stimulate the intellectual and verbal development of their preschool children was effective in accelerating the development of these children. These gains seem particularly encouraging in view of the minimum budget and professional staff required.

Classroom Intervention Between the Ages of Three to Five

In order to assess the effectiveness of various forms of classroom intervention all classes were comparable in regard to measured intelligence, racial composition, and distribution of sexes.

I will report first on a study which compares the effects of five different intervention programs on the intellectual and language development of four-year-old disadvantaged children. The five programs of intervention may be summarized as follows:

1. A traditional nursery school program for disadvantaged children was established under the administration of the research director. A major goal of the program was to foster the acquisition of social skills. Teachers were instructed to capitalize on opportunities for incidental and informal learning.
2. The Karnes' program for the amelioration of learning deficits is a highly structured program based on psychological theories. Activities which employ a game format and stress motor-sensory manipulation are carefully programmed to help the disadvantaged child overcome specific deficits in learning as well as in basic motivation and to accelerate his development in areas which will enable him to cope more successfully with later school tasks. The curriculum is designed to develop the basic language processes as well as to teach specific content in the areas of mathematics, language arts, social studies and science. Since language is the area of greatest weakness among these children, the development of language skills was a basic goal throughout the curriculum. Because these children seem to profit from educational experiences less well than their peers

from more favorable socio-economic backgrounds, special emphasis is placed on helping them process information.

3. The Bereiter-Engelmann approach is also a highly structured program and represents a sharp break with the child development tradition. The educational program is derived from an analysis of material to be learned rather than from an analysis of the children or from psychological principles. The program consists of sessions of intensive direct verbal instruction in language, reading, and arithmetic. Direct verbal interaction is the primary teaching strategy. For a detailed account of this program I refer you to Teaching Disadvantaged Children in the Preschool, by Carl Bereiter and Siegfried Engelmann, published by Prentice Hall in 1966.

4. The Montessori program was administered by the local society and employed a qualified Montessori teacher. The classroom was well equipped with approved Montessori materials.

5. The Community Integrated program provided a traditional nursery school program at four neighborhood centers. These centers were licensed by the state and were sponsored by community groups. Professional preschool teachers were employed. These classes were composed predominantly of middle class children; two or three disadvantaged children attended each session.

You will find in Table IIIa that the initial Binet means of the five groups were essentially comparable. All groups made IQ gains over the time period. The Binet means for the Direct Verbal and for the Amelioration of Learning Deficits classes were significantly superior to

those of the other three but were not significantly different from each other on test 2. The Binet mean of the children in the traditional class was significantly higher on test 2 than on test 1. The Montessori and Community Integrated groups were not significantly higher on test 2 than on test 1. These three groups were not significantly different from each other on test 2. Figure III depicts these differences. It should be noted that the Montessori and Community Integrated classes represent smaller N's than those of the other three groups. It does appear, however, that the two structured programs, although quite different in their approach, enhanced the intellectual functioning of disadvantaged children significantly more than did the other three programs. The gains of the subjects in the traditional program were in keeping with the gains reported by other preschool studies. This study found little support for integrating disadvantaged children into middle class nursery schools so far as intellectual acceleration is concerned. Likewise, it would seem that this Montessori program has little to offer the disadvantaged relative to altering their intellectual functioning.

Table IVa and Figure IV present data on the Illinois Test of Psycholinguistics. Since the five groups were not matched on language age scores there were small initial differences which reached significance in some instances. All groups were higher on test 2 than on test 1. The mean language ages of the Traditional, the Direct Verbal, and the Amelioration of Deficits' groups were significantly superior to those of the Montessori and the Community Integrated classes at test 2. The Amelioration of Learning Deficits' group made 14 months' gain in language age; the Direct Verbal, 13 months; the Traditional,

11 months; the Community-Integrated, 10 months -- gains greater than the test interval. However, the Montessori group failed to make gains equal to the test interval, and it would appear that this program has the least of the five programs to offer in terms of accelerating language development.

Subsequently three of these five groups (Amelioration of Learning Deficits, the Direct Verbal Instruction and the Traditional program) were provided with different follow-up programs in an attempt to answer the question, "How long should special intervention be continued?" At the end of the second year these three groups were evaluated in terms of intellectual and verbal development as well as school readiness. It will be noted in Table Va and in Figure V that the N of the Direct Verbal group is only 11 as compared to an N of 24 in the Amelioration of Learning Deficits program and an N of 28 in the Traditional program. The Direct Verbal Instruction group now has an N of 11 rather than the N of 29 cited earlier because the second class has not yet completed its kindergarten year and the period two scores are not available. This difference in N accounts for the different means reported for the Direct Verbal group. A later analysis will include means for the larger N when this data is available. In addition, the Amelioration of Learning Deficits' group lost three children. The mean for this smaller N (24) is reported for all three test periods.

During the second year these groups were again enrolled in three different programs. The traditional group attended public school kindergarten only. The Bereiter-Engelmann Direct Verbal group did not attend public school kindergarten but were provided with two hours and fifteen minutes or a half-day continuation of their program. The Karnes' Amelioration of Learning Deficit children had a dual kindergarten program. The children attended the public school kindergarten in the morning and had an hour of specialized

supportive instruction in the afternoons in the area of language arts and math.

When we examine the data on Table Va and Figure V it is clear that the Direct Verbal group made significantly greater gains on the Stanford-Binet during the second program interval than did the other two groups. The Direct Verbal group made a nine-point additional IQ gain from test 2 at the end of the first year to test 3 at the end of the second year and thus progressed from the normal range of intelligence (IQ 97) to the superior range (IQ 120). On the other hand, the mean IQ's of the children in the Amelioration of Learning Deficits' program lost approximately one IQ point from the end of the first year to the termination of the second year. This loss was not significant. This group was significantly higher on test 3 than on test 1 and remained statistically superior to the traditional group over the two-year period. The Traditional group regressed three IQ points leaving only a five-point gain over the two year span. The traditional group was not now performing significantly better on test 3 than they did on test 1.

Inspection of Table VIa and Figure VI which give the results on the ITPA clearly point up the superiority of the Direct Verbal group during the second interval. These children made 15 months' progress in language. The Traditional and Amelioration of Learning Deficits' groups were not significantly different from each other at the end of the second interval and had made approximately half the progress of the Direct Verbal group.

The results of the Metropolitan Readiness test present a somewhat different picture of the three groups. As is seen in Table VIIa and ~~Figure~~ Figure VII the Amelioration of Learning Deficits' group made significantly higher scores on this measure of school readiness than did the Direct Verbal or the Traditional group. The Amelioration of Learning Deficits' group

obtained a mean raw score that placed them in the 94th percentile, while the mean score of the Direct Verbal group fell at the 86 percentile. So far as readiness to do first grade work, both groups fell in the superior range according to the test manual. The Traditional group's mean score placed them at the 52 percentile which is interpreted as low average readiness for school. These percentiles are presented in Table VIIb and in Figure VIIb.

It would appear from the analysis of the data on the length of time of intervention that the gains made during a year of nursery school experience are not maintained without further special intervention, as indicated by the scores of the traditional group. On the other hand, a half-day special program [redacted] seems to pay off in terms of increased acceleration of both intellectual functioning and language development, as indicated by the data on the Direct Verbal program during the second interval. A dual kindergarten where subjects attend the public school kindergarten and are given supportive training for one hour a day enabled children to maintain their IQ gains and to make language progress in keeping with their chronological age expectancy. This supportive program which stressed reading and arithmetic readiness did pay off in terms of preparing these children for school as revealed by scores on the Metropolitan Readiness test.

A third study has relevance to the question, "At what age is classroom intervention most effective?" The major goal of this research was to determine if the Amelioration of Learning Deficits' program would be more effective if initiated at age three rather than age four. This study employed a control group who received no educational intervention between the ages of three and four.

In Table VIII and Figure VIII you will find a comparison of the groups in Binet IQ. The three-year-old experimental subjects gained 17 IQ points

during the ten-month testing interval while the control subjects who remained at home with no educational intervention regressed 3 Binet IQ points.

In Table IX you will find a comparison of the groups on the Illinois Test of Psycholinguistic Abilities. Initially there was no significant difference between the control and experimental groups. At the time of the posttest the experimental group was significantly higher on total language age. As can be seen in Figure IX the experimental group gained 16.9 months, the control group gained 7.6 months. At the time of the pretest, both groups were functioning below their chronological age expectancies. Posttest results revealed that the experimental subjects had overcome their initial deficit and their language age scores were now two months above their CA. The initial four-month deficit of the control children, however, had increased to eight months at the time of the posttest.

These results seem very encouraging and lend support to classroom intervention at age three rather than age four. However, the most important comparisons will be made when these children have completed a second year of the program and have reached the age of five. This comparison will more precisely assess the effectiveness of such intervention at age three. Evaluations of the children in these studies will be made during the early elementary grades to assess their school adjustment and academic achievement. Hopefully more definitve answers to the three questions posed will be provided by these evaluations.

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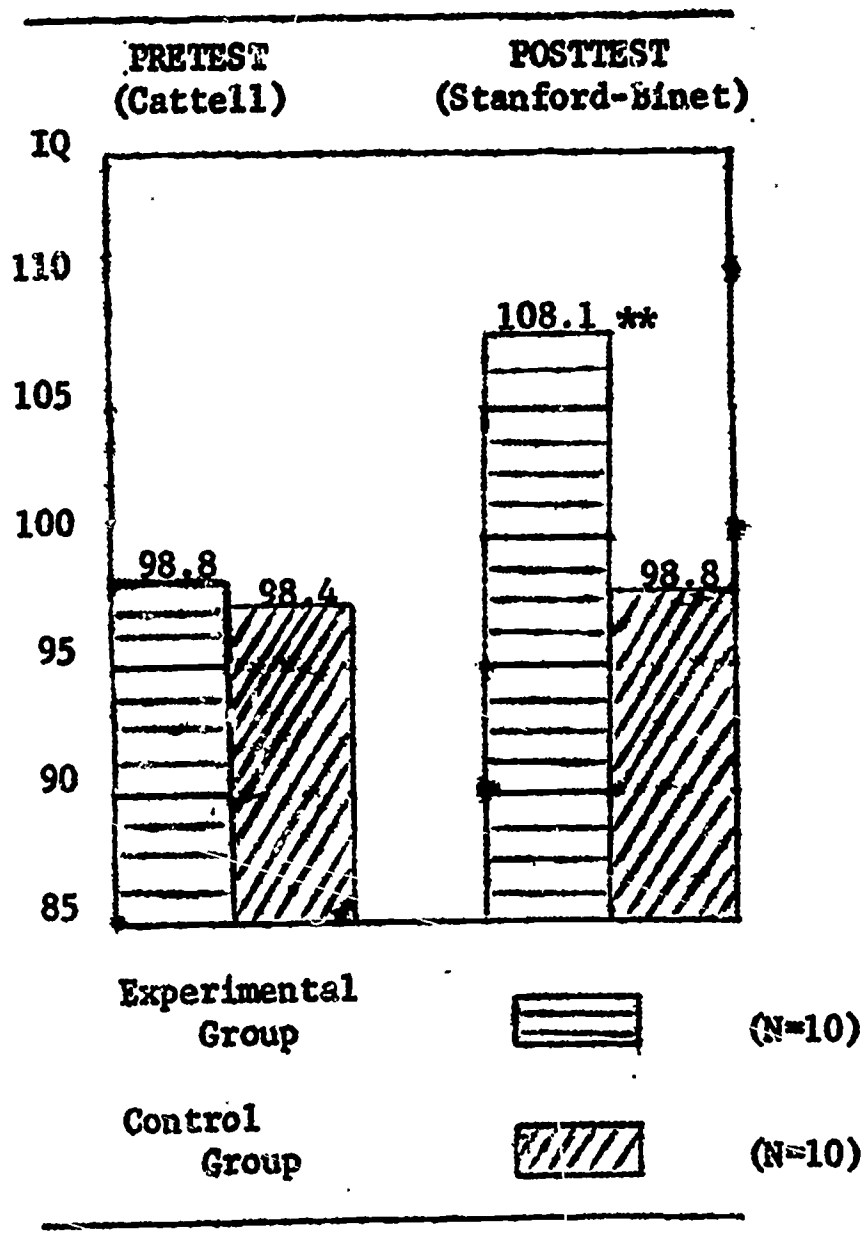
Figure I

Pretest and Posttest Mean IQ Scores of Infants After One Year of Tutoring*

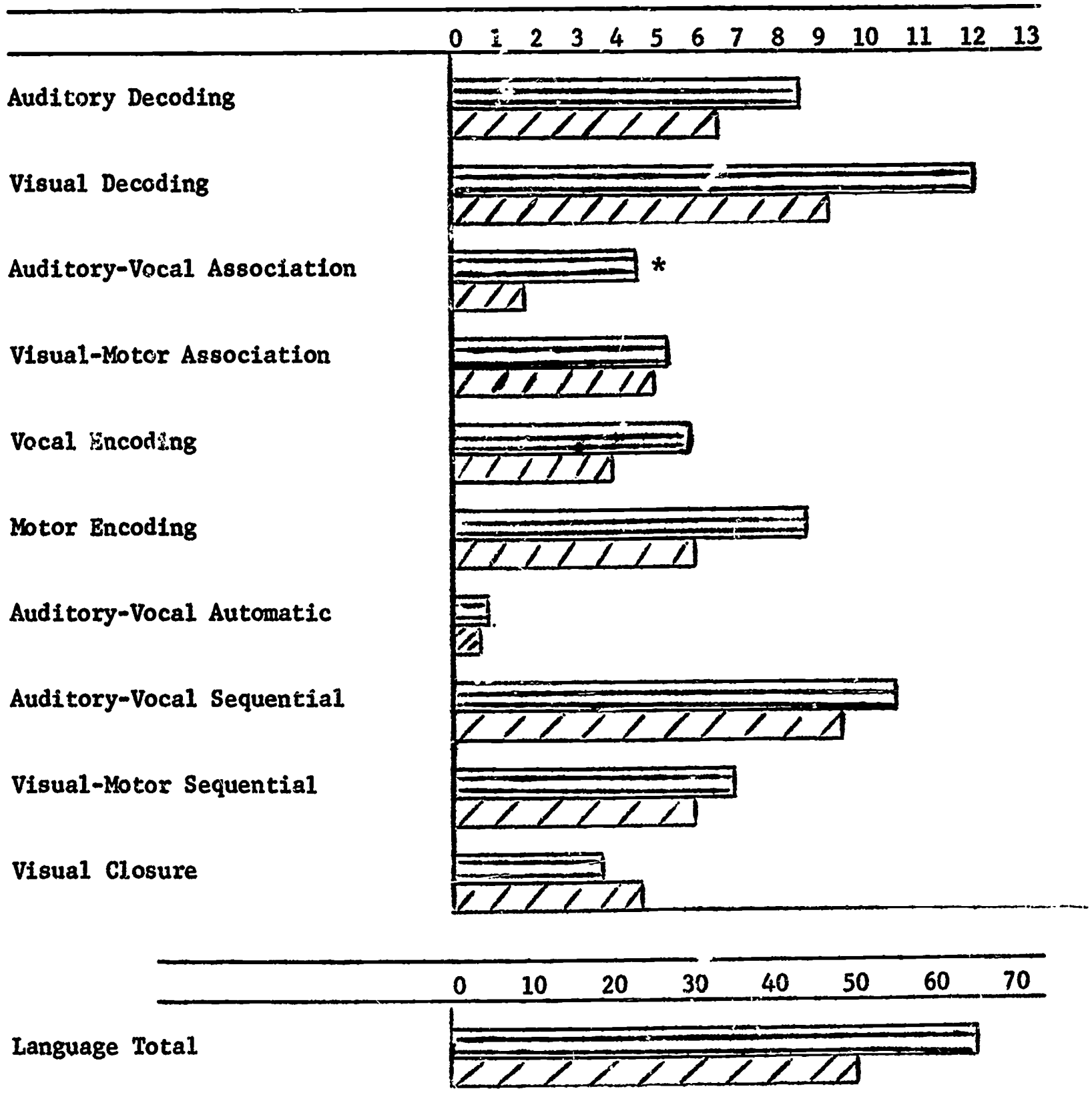


*Painter, Genevieve. The Effect of a Tutorial Program on the Intellectual Development of Disadvantaged Infants, Unpublished Doctoral Dissertation, University of Illinois, 1967.

**Significant at the .05 level.

Figure II

(Tutorial Program with Infants)**
Experimental and Control Group Comparisons on ITPA***
Adjusted Mean Raw Scores



*Significant at the .05 level.

**Painter, Genevieve. The Effect of a Tutorial Program on the Intellectual Development of Disadvantaged Infants, Unpublished Doctoral Dissertation, University of Illinois, 1967.

***Unpublished Revision of the Illinois Test of Psycholinguistic Abilities.

Table I

An Approach for Working with Mothers of Disadvantaged Three and Four Year Old Children**
IQ Means and Variances on
Stanford-Binet Intelligence Scale, Form L-M

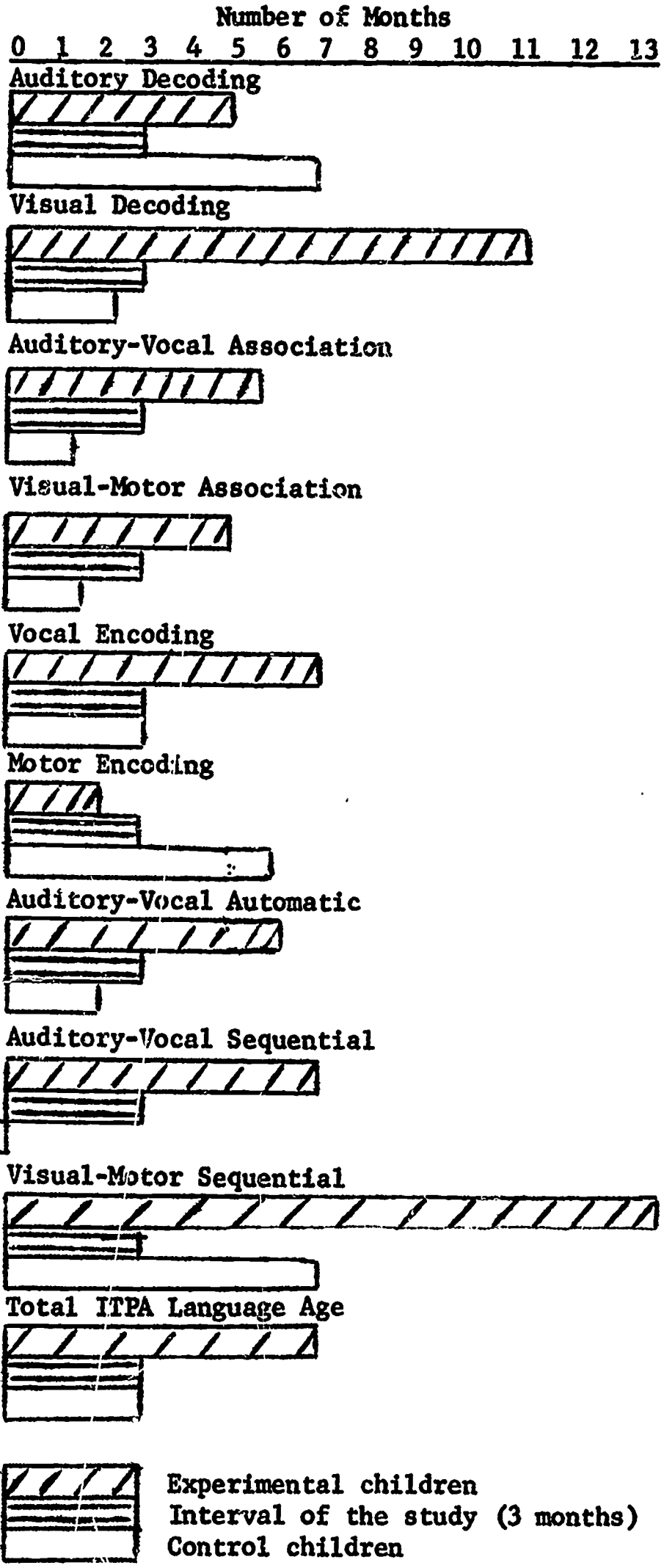
	$\bar{X}$	S^2	Difference Between Means	t+
Pretest Scores				
Experimental	91.3	63.4	-4.2	-1.03
Control	95.5	143.6		
Posttest Scores				
Experimental	98.8	71.7	3.3	.87
Control	95.5	108.1		
Gain Scores				
Experimental	7.5	83.2	7.5	2.12*
Control	.0	73.9		

*Significant at the .05 level
**Conducted by Merle B. Karnes
+One-tailed t test

Experimental N=13
Control N=13

Table II

(An Approach for Working with Mothers of Disadvantaged Three and Four Year Old Children)***
Gains on Subtests and Total Score of the ITPA



Group	$\bar{X}$****	S^2	Difference Between Means	t**
Exp.	.42	.63	-.13	-.42
Cont.	.55	.61		
Exp.	.88	.62	.70	2.12*
Cont.	.18	.74		
Exp.	.53	.20	.43	1.87*
Cont.	.10	.45		
Exp.	.40	.79	.30	.94
Cont.	.10	.59		
Exp.	.63	.46	.33	1.32+
Cont.	.30	.34		
Exp.	.23	-.39	-.22	-.67
Cont.	.45	1.08		
Exp.	.50	.84	.32	.97
Cont.	.18	.63		
Exp.	.55	.49	.61	1.84*
Cont.	-.06	.91		
Exp.	1.10	.95	.48	1.07
Cont.	.62	1.67		
Exp.	.58	.32	.32	1.52+
Cont.	.26	.29		

Experimental children (N=13)
Interval of the study (3 months)
Control children (N=13)

+Significant at .10 level
*Significant beyond .05 level
++During the three-month interval, the control subjects regressed approximately one month in this area.
**One-tailed t test
***Conducted by Merle B. Karnes
****Mean reported in hundredths of a year.

Table III

Analysis of Variance
over
One Program Interval
for
The Five Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits -
Montessori - Community Integrated)
on Binet IQ

Factor	Degrees of Freedom		Mean Square	F Ratio	Level of Significance
	Num	Den			
Groups	4	106	385.529	1.65455	NS*
Sex	1	106	1010.222	4.33551	.05
Groups x Sex	4	106	179.190	.76902	NS
Subjects	106		233.011		
Time Periods	1	106	4727.873	138.87390	.01
Groups x Time Periods	4	106	236.818	6.95616	.01
Sex x Time Periods	1	106	10.764	.31619	NS
Groups x Sex x Time Periods	4	106	54.695	1.60657	NS
Time Periods x Subjects	106		34.044		

*NS indicates non-significance

Table IIIa

Mean Binet IQ
over
One Program Interval
for
The Five Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits -
Montessori - Community Integrated)

Chronological Age		4-4		5-0
Group	N	Test 1	N	Test 2
Traditional	28	94.5	28	102.6
Direct Verbal	29	93.2	29	107.6
Amelioration of Learning Deficits	27	96.0	27	110.3
Montessori	16	94.1	16	99.6
Community Integrated	16	93.3	16	98.4

A Newman-Keuls test at the .05 level was performed on the means in the above table. The results are summarized below.

1. There were no significant differences between groups on test 1.
2. All groups except the Community Integrated and Montessori were significantly higher on test 2 than on test 1.
3. The Community Integrated, Montessori, and Traditional groups were not significantly different on test 2.
4. The Direct Verbal and Amelioration of Learning Deficits groups were both significantly higher than the Community Integrated, Montessori and Traditional groups on test 2.
5. The Direct Verbal and Amelioration of Learning Deficits groups were not significantly different on test 2.

Figure III

Mean Binet IQ
Over One Program Interval
for the Five Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits
Montessori - Community Integrated)

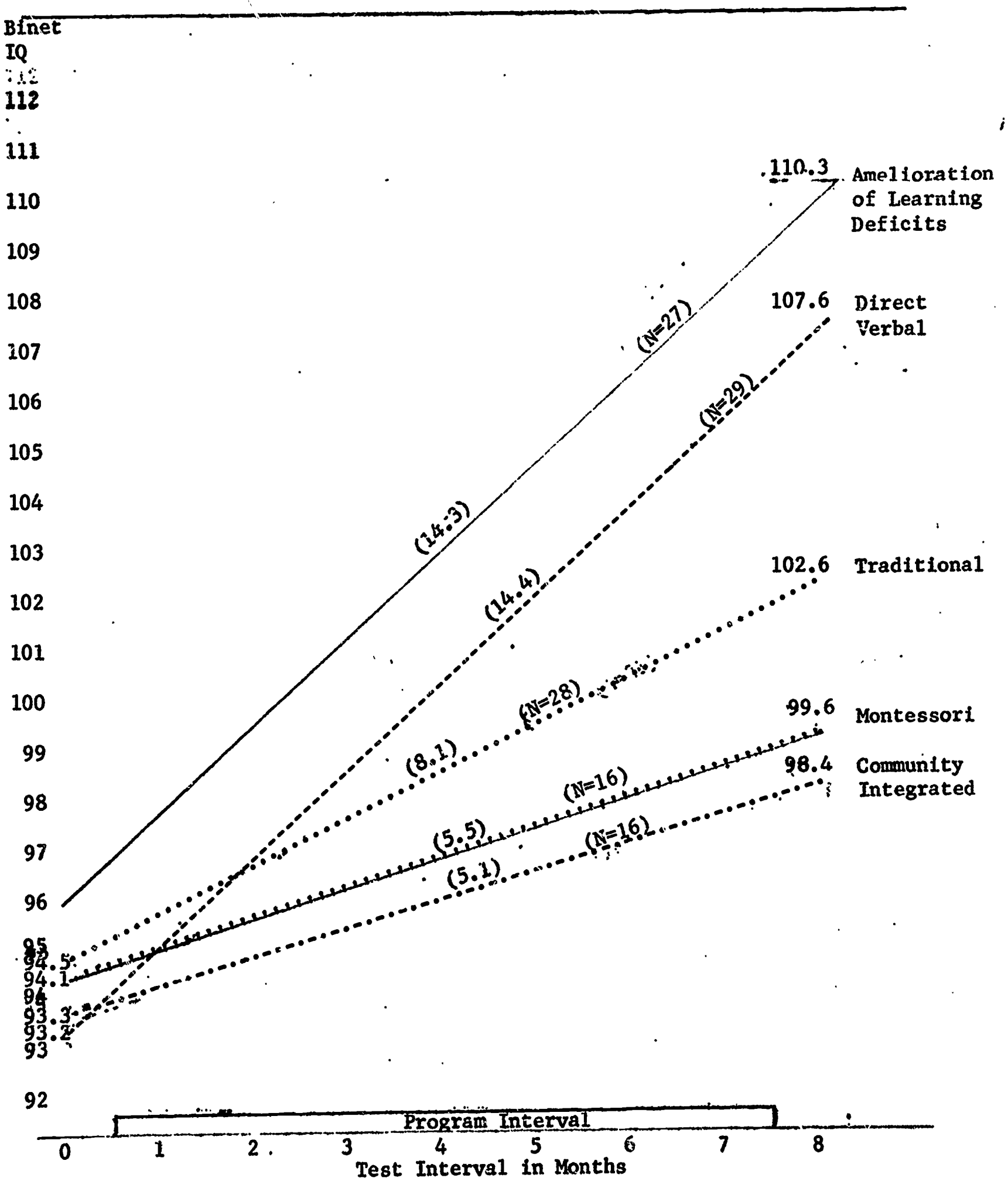


Table IV

Analysis of Variance
over
One Program Interval
for
The Five Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits - Montessori - Community Integrated)
on the Total Language Age in Months on the ITPA

Factor	Degrees of Freedom		Mean Square	F Ratio	Level of Significance
	Num	Den			
Groups	4	104	460.214	3.87107	.01
Sex	1	104	110.262	.92747	NS*
Groups x Sex	4	104	149.838	1.26036	NS
Subjects	104		118.885		
Time Periods	1	104	6398.276	432.06710	.01
Groups x Time Periods	4	104	81.898	5.53049	.01
Sex x Time Periods	1	104	17.044	1.15097	NS
Groups x Sex x Time Periods	4	104	5.130	.34641	NS
Time Periods x Subjects	104		14.809		

*NS indicates non-significance

Table IVa

Mean Language Age
in Months on the ITPA
over
One Program Interval
for
The Five Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits -
Montessori - Community Integrated)

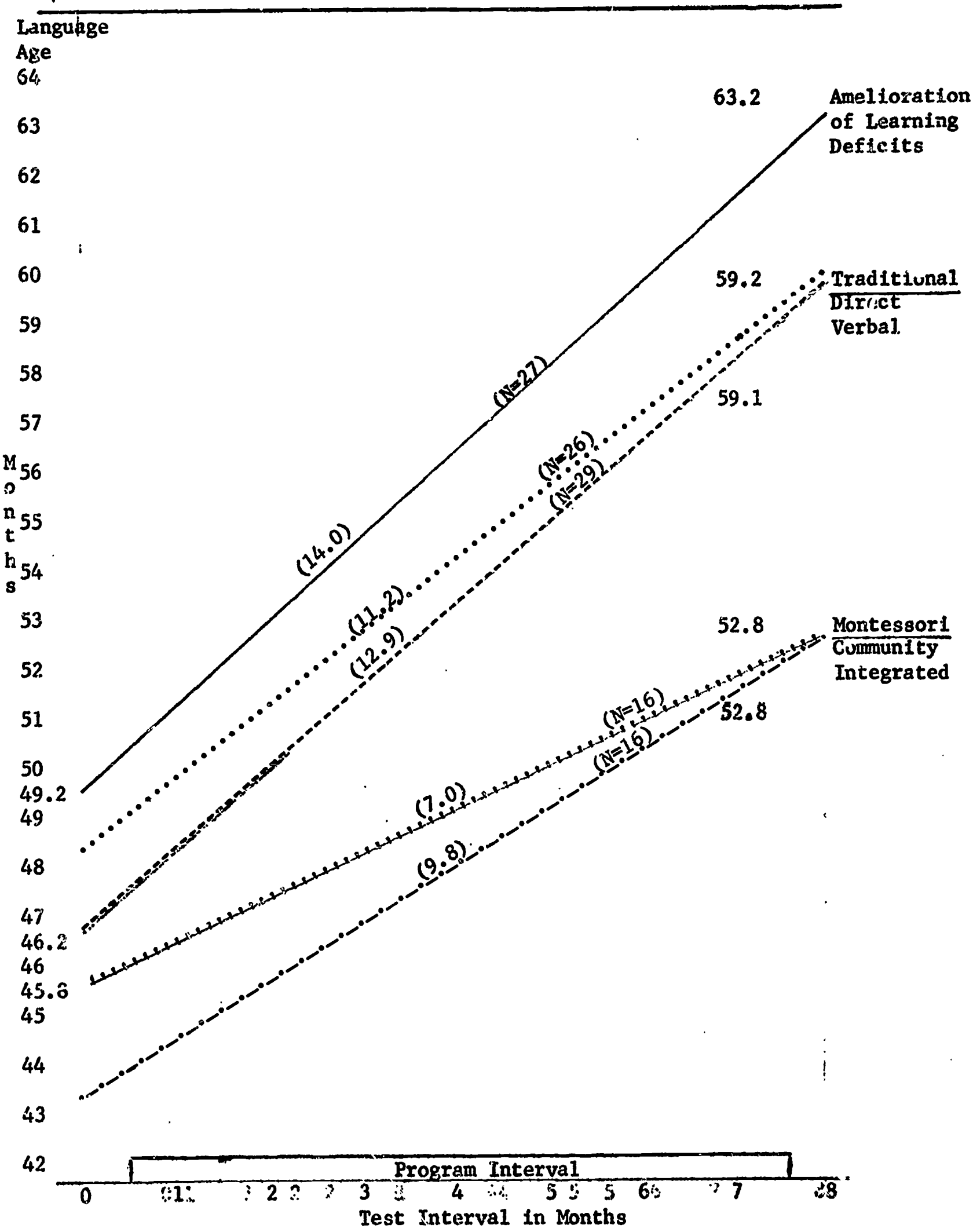
Chronological age		4-4		5-0
Group	N	Test 1	N	Test 2
Traditional	26	48.0	26	59.2
Direct Verbal	29	46.2	29	59.1
Amelioration of Learning Deficits	27	49.2	27	63.2
Montessori	16	45.8	16	52.8
Community Integrated	16	43.0	16	52.8

A Newman-Keuls test at the .05 level was performed on the means in the above table. The results are summarized below.

1. The Traditional and Amelioration of Learning Deficits groups were significantly higher on test 1 than the other 3 groups.
2. All groups were significantly higher on test 2 than on test 1.
3. On test 2 the Direct Verbal, Traditional and Amelioration of Learning Deficits groups were not significantly different from each other.
4. On test 2, the Direct Verbal, Traditional and Amelioration of Learning Deficits groups were all significantly higher than the Montessori and Community Integrated groups.

Figure IV

Mean Language Age
in Months on the ITPA
Over One Program Interval
For the Five Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits;
Montessori - Community Integrated)



Chronological Age
4-4

5-0

Table V

Analysis of Variance
over
Two Program Intervals
for
The Three Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits)
on Binet IQ

Factor	Degrees of Freedom		Mean Square	F Ratio	Level of Significance
	Num	Den			
Groups	2	57	1486.676	4.75828	.05
Sex	1	57	297.658	.95269	NS*
Groups x Sex	2	57	39.291	.12576	NS
Subjects	57		312.440		
Time Periods	2	114	2982.937	82.08894	.01
Groups x Time Periods	4	114	425.888	11.72023	.01
Sex x Time Periods	2	114	64.363	1.77124	NS
Groups x Sex x Time Periods	4	114	6.822	.18774	NS
Time Periods x Subjects	114		36.338		

*NS indicates non-significance

Table Va

Mean Binet IQ
over Two Program Intervals
for the Three Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits)

Date		10-65		6-66		6-67	
Chronological Age		4-4		5-0		6-0	
Group	N	Test 1	N	Test 2	N	Test 3	
Traditional	28	94.5	28	102.6	28	99.6	(Kindergarten only)
Direct Verbal	11	97.0	11	111.5	11	120.4	(No kindergarten -special halfday program)
Amelioration of Learning Deficits	24	96.2	24	110.0	24	108.6	(Kindergarten and special 1 hour program)

A Newman-Keuls test at the .05 level was performed on the means in the above table. The results are summarized below.

1. The three groups were not significantly different on test 1.
2. All groups were significantly better on test 2 than on test 1.
3. The Direct Verbal and Amelioration of Learning Deficits groups were not significantly different on test 2 and both were significantly higher than the Traditional group.
4. On test 3 all three groups were significantly different.
5. The Traditional group was not significantly better on test 3 than on test 1.
6. The Amelioration of Learning Deficits group was significantly better on test 3 than on test 1.
7. The Amelioration of Learning Deficits group was not significantly different from test 2 to test 3.
8. The Direct Verbal group was significantly higher on test 3 than on test 2.

Figure V

Mean Binet IQ
Over Two Program Intervals
for the Three Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits)

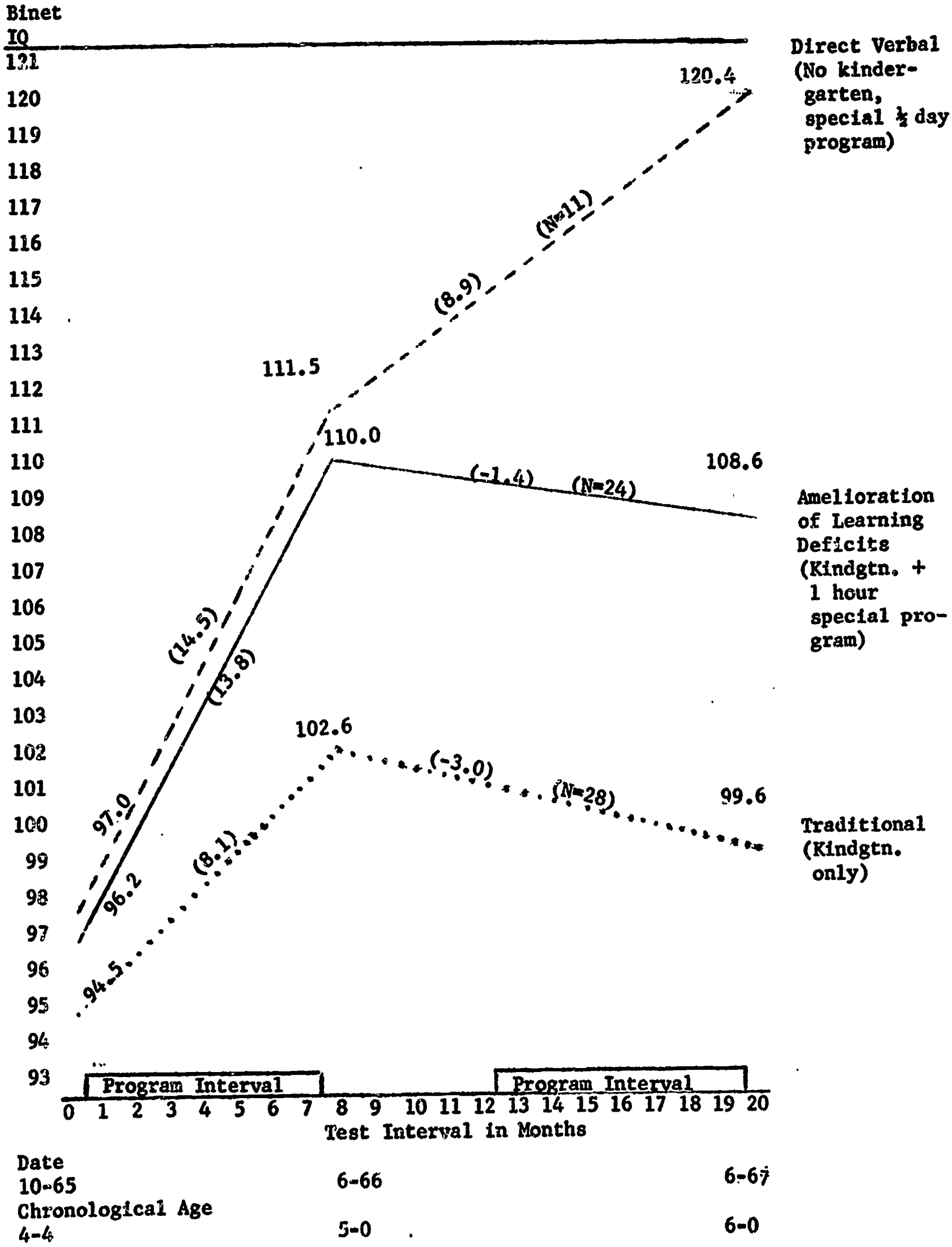


Table VI

Analysis of Variance
over
Two Program Intervals
for
The Three Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits)
on the Total Language Age in Months on the ITPA

Factor	Degrees of Freedom		Mean Square	F Ratio	Level of Significance
	Num	Den			
Groups	2	55	71.972	.44066	NS*
Sex	1	55	44.263	.27101	NS
Groups x Sex	2	55	79.539	.48699	NS
Subjects	55		163.330		
Time Periods	2	110	6761.325	396.29748	.01
Groups x Time Periods	4	110	98.666	5.78303	.01
Sex x Time Periods	2	110	30.638	1.79574	NS
Groups x Sex x Time Periods	4	110	8.398	.49221	NS
Time Periods x Subjects	110		17.061		

*NS indicates non-significance

Table VIa

Mean Language Age
in Months on the ITPA
over
Two Program Intervals
for the Three Intervention Programs
(Traditonal - Direct Verbal - Amelioration of Learning Deficits)

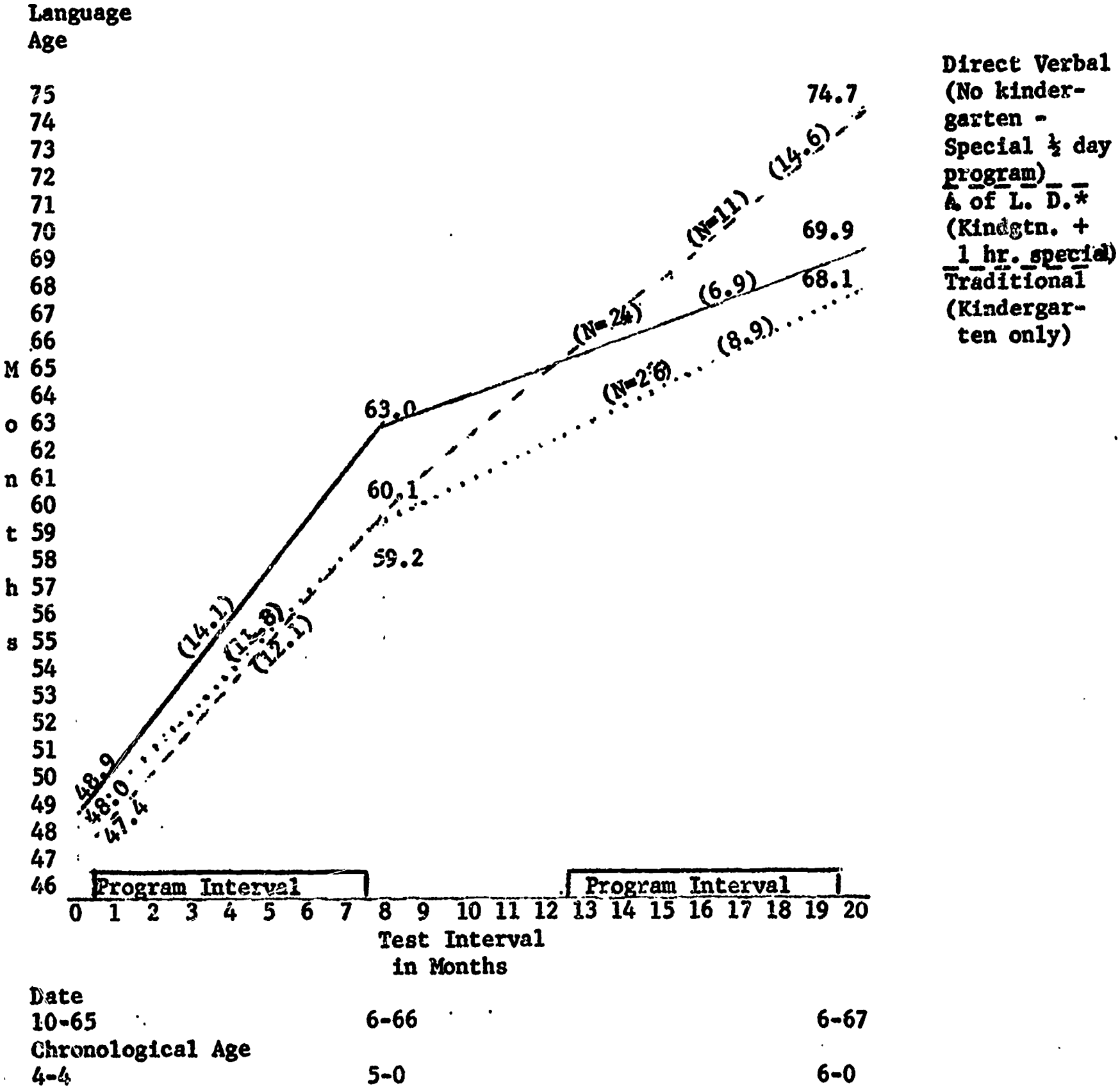
Date		10-65		6-66		6-67	
Chronological Age		4-4		5-0		6-0	
Group	N	Test 1	N	Test 2	N	Test 3	
Traditional	26	48.0	26	59.2	26	68.1	(Kindergarten only)
Direct Verbal	11	47.4	11	60.1	11	74.7	(No Kindergarten-special half day program)
Amelioration of Learning Deficits	24	48.9	24	63.0	24	69.9	(Kindergarten and one hour special program)

A Newman-Keuls test at the .05 level was performed on the means in the above table. The results are summarized below.

1. The three group were not significantly different on test 1.
2. All three groups were significantly higher on test 2 than on test 1.
3. All three groups were significantly higher on test 3 than on test 2.
4. On test 2 the Traditional and Direct Verbal groups were not significantly different.
5. On test 2 the Amelioration of Learning Deficits group was significantly higher than the Traditional and Direct Verbal groups.
6. On test 3 the Traditional and Amelioration of Learning Deficits groups were not significantly different.
7. On test 3 the Direct Verbal group was significantly higher than the Traditional and Amelioration of Learning Deficits groups.

Figure VI

Mean Language Age in Months on the ITPA Over Two Program Intervals For the Three Intervention Programs (Traditional - Direct Verbal - Amelioration of Learning Deficits)



Date		
10-65	6-66	6-67
Chronological Age		
4-4	5-0	6-0

* Amelioration of Learning Deficits

Table VII.

Analysis of Variance
over
Test Batteries Two and Three
for
The Three Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits)
on the Metropolitan Total Score

Factor	Degrees of Freedom		Mean Square	F Ratio	Level of Significance
	Num	Den			
Groups	2	55	2114.249	9.82055	.01
Sex	1	55	3.376	.01568	NS*
Groups x Sex	2	55	34.172	.15872	NS
Subjects	55		215.290		
Time Periods	1	55	21581.189	391.79337	.01
Groups x Time Periods	2	55	203.897	3.70163	.05
Sex x Time Periods	1	55	101.120	1.83577	NS
Groups x Sex x Time Periods	2	55	6.971	.12656	NS
Time Periods x Subjects	55		55.083		

*NS indicates non-significance

Table VIIa

Mean Metropolitan Total Score
for Test Batteries Two and Three
for the Three Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits)

Date		6-66		6-67
Chronological Age		5-0		6-0
Group	**N**	**Test 2**	**N**	**Test 3**
Traditional	27	43.8	27	67.4
Direct Verbal	11	51.3	11	81.6
Amelioration of Learning Deficits	23	54.8	23	87.1

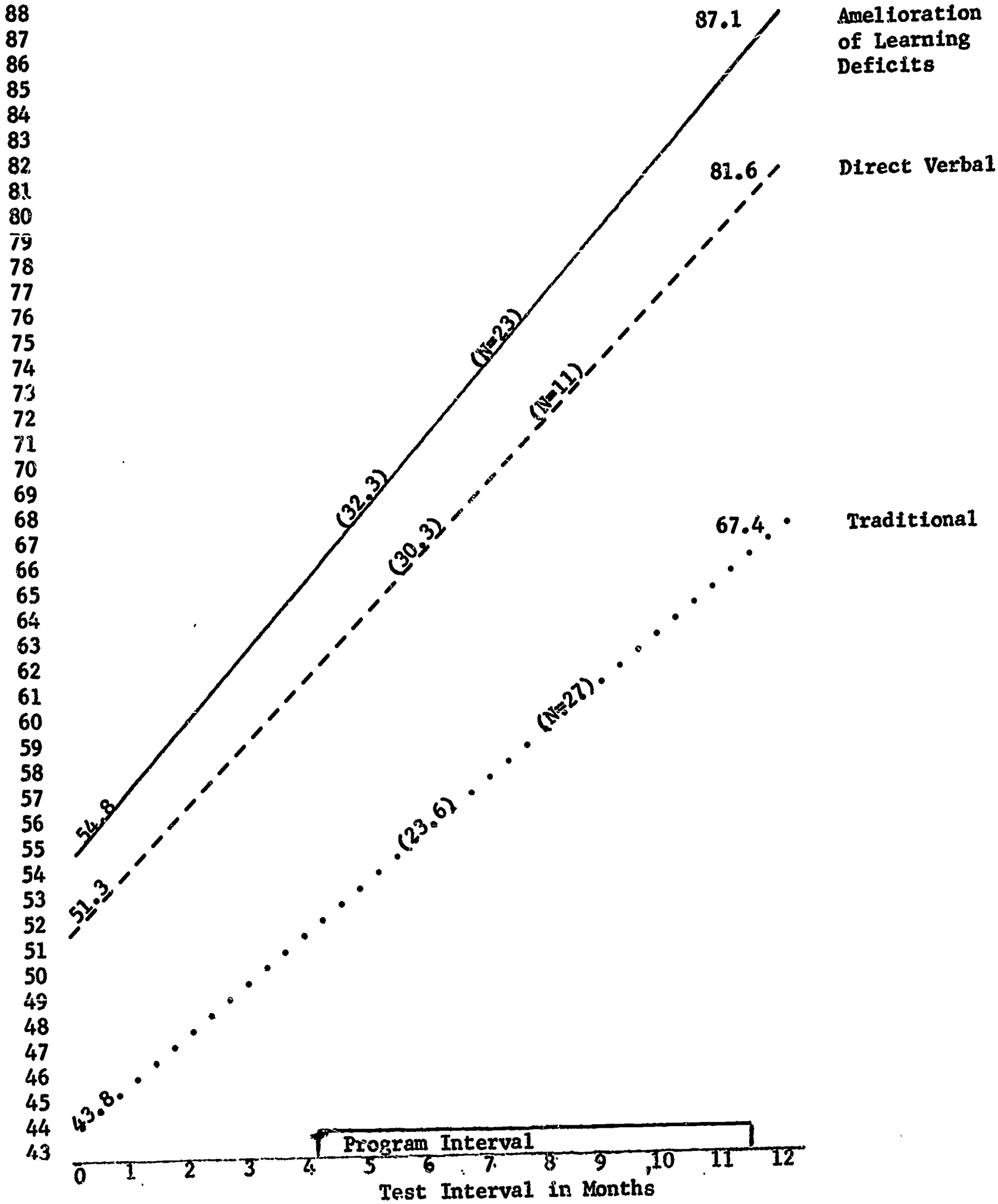
A Newman-Keuls test at the .05 level was performed on the means in the above table. The results are summarized below.

1. All means are significantly different from each other except the Direct Verbal and Amelioration of Learning Deficits on test 2.

No children in the Traditional or Direct Verbal groups had total scores of 94 or above on test 3. Seven children in the Amelioration of Learning Deficits groups had total scores of 94 or above. Scores of 94 and above are at percentile 99.

Figure VII

Mean Metropolitan Total Score
for Test Batteries Two and Three
for the Three Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits)



Date
6-66 6-67

Chronological Age
5-0 6-0

Table VIIb

Percentiles For
Metropolitan Total Score
For the Three Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits)
for Test Batteries 2 and 3

	Test 2			Test 3		
Group	N	Percentile	Readiness Status	N	Percentile	Readiness Status
Traditional	27	12	Poor risk	27	52	Low Normal
Direct Verbal	11	20	Poor risk	11	86	Superior
Amelioration of Learning Deficits	23	27	Poor risk	23	94	Superior
Date		6-66			6-67	
Chronological Age		5-0			6-0	

Figure VIIb

Percentiles for
Metropolitan Total Score
For the Three Intervention Programs
(Traditional - Direct Verbal - Amelioration of Learning Deficits)
for Test Batteries 2 and 3

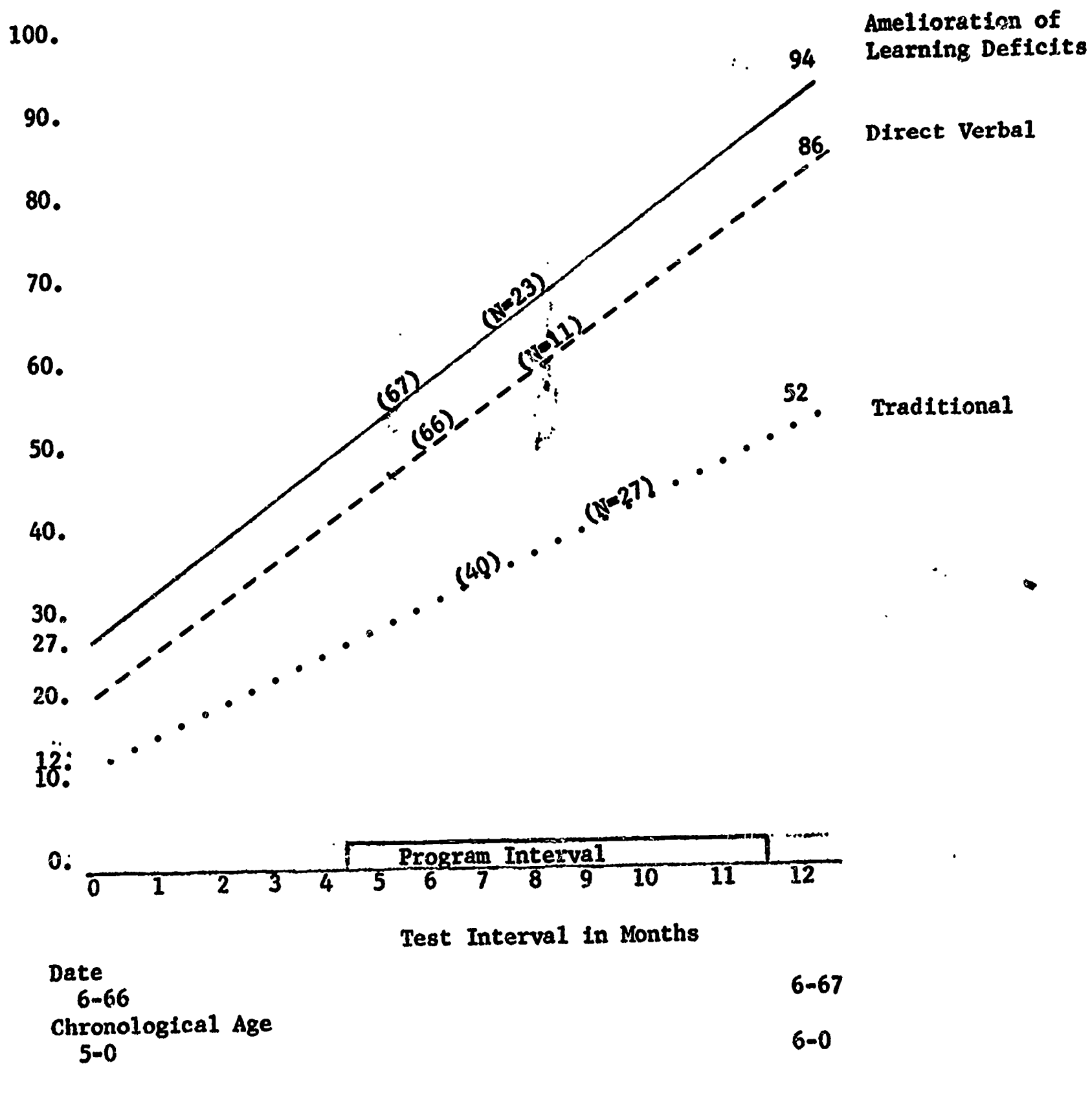


Table VIII

Mean Stanford-Binet Intelligence Scale, Form LM,
on Pre and Post Measures
(In~~v~~vention: Amelioration of Learning Deficits)*
Program at Age Three

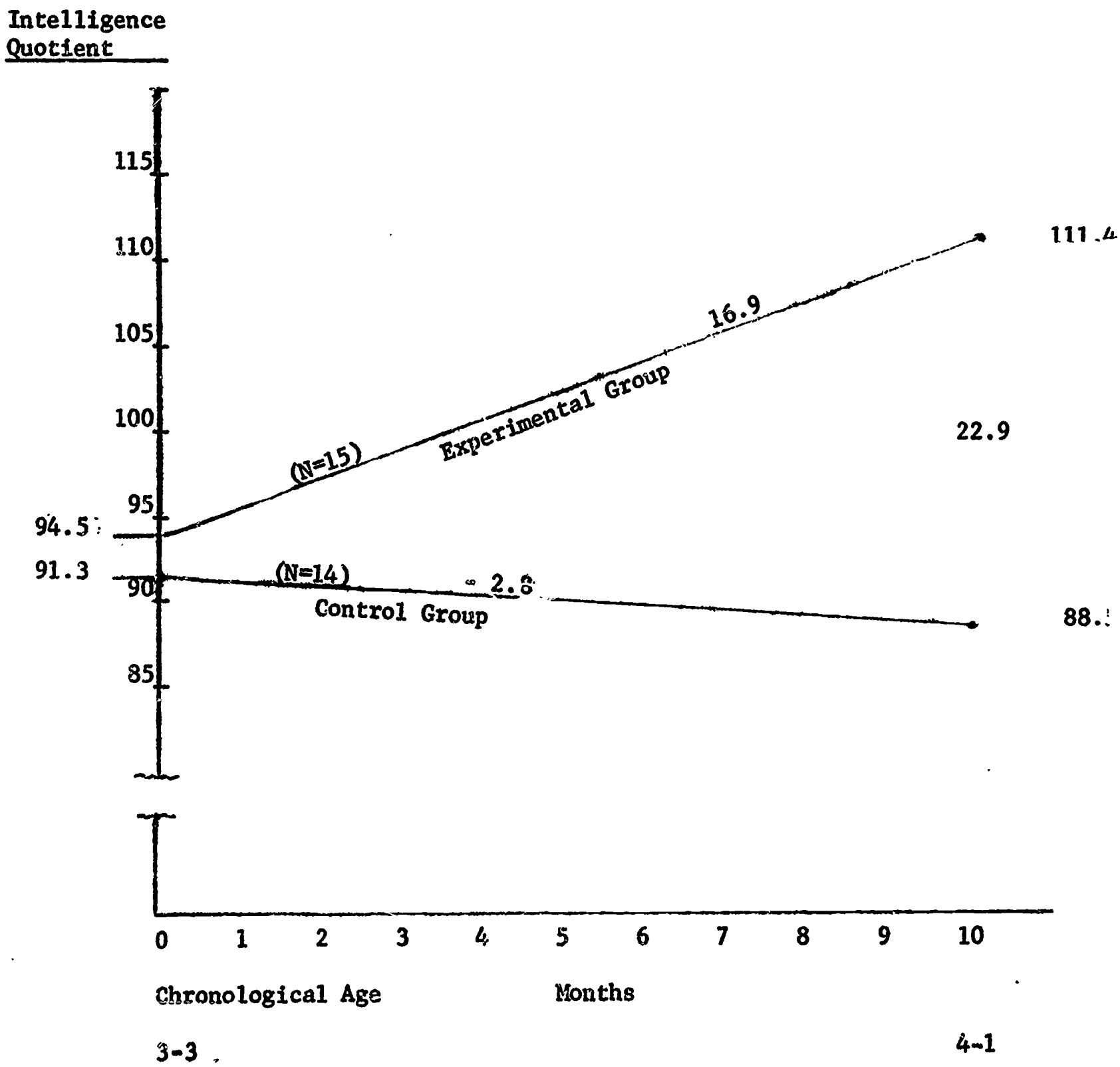
	Pretest		Posttest		Difference between Pre- and Posttest Means	
	Exper.	Control	Exper.	Control	Exper.	Control
Mean	94.5	91.3	111.4	88.5	16.9	- 2.8
Variance	83.7	133.5	41.9	269.6	89.9	68.3
Difference Between Means	3.2		22.9		19.7	
t Value	.82		4.88		5.90	
Level of Significance	NS		.001		.001	

*Conducted by Merle B. Karnes

Experimental N = 15
Control N = 14

Figure VIII

Comparison of mean Binet IQ Scores of
Experimental and Control Groups
Over the Ten Month Testing Interval
(Intervention: Amelioration of Learning Deficits)*
Program at Age Three

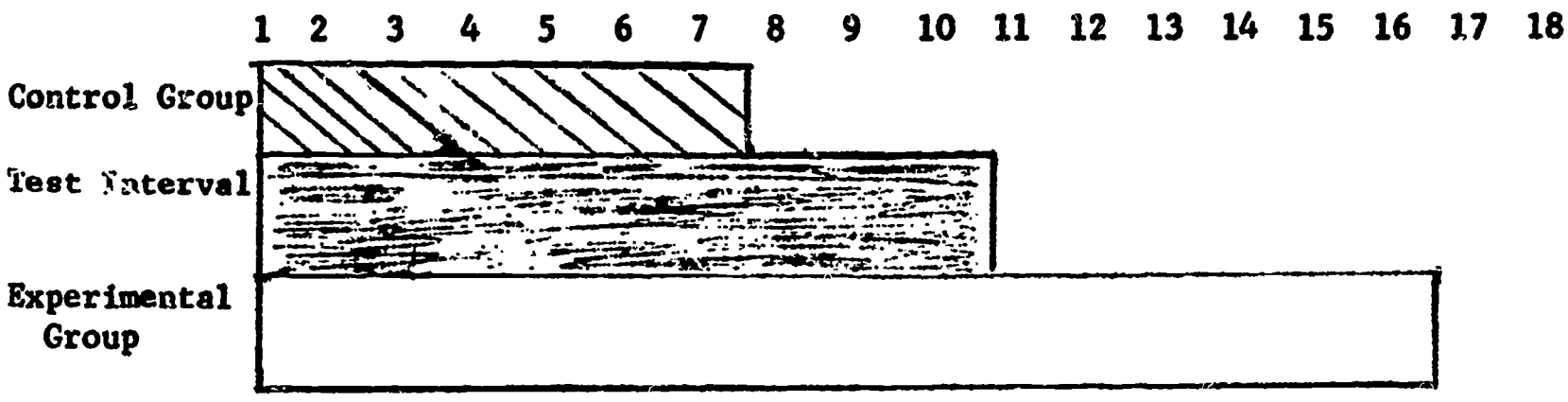


*Conducted by Merle B. Karnes

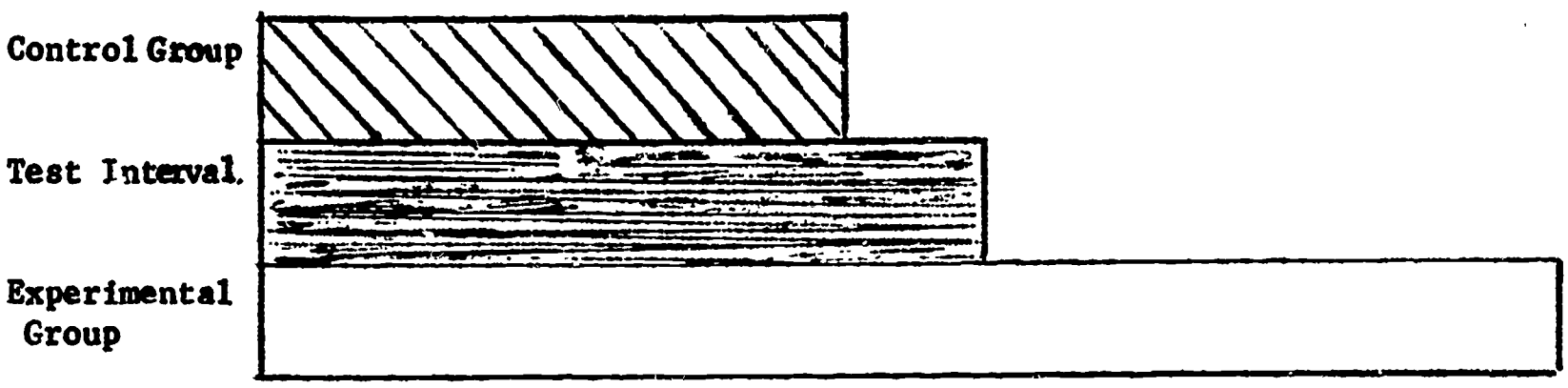
Figure IX

Gains in Months for ITPA Language and Binet Mental Age
for Experimental and Control Children
during the Ten Month Testing Interval
(Intervention: Amelioration of Learning Deficits)*
Program at Age Three

<u>ITPA Language Age Gains</u>



<u>Binet Mental Age Gains</u>



*Conducted by Merle B. Karnes

Table IX

Illinois Test of Psycholinguistic Abilities,
Total Language Age Scores
Reported in Months
(Intervention: Amelioration of Learning Deficits)*
Program at Age Three

	Pretest		Posttest		Differences between Pre- and Posttest Means	
	Exper.	Control	Exper.	Control	Exper.	Control
Mean	33.3	34.1	50.1	41.8	16.9	7.6
Variance	25.4	17.9	33.9	96.5	35.4	47.5
Difference Between Means	.8		8.3		9.3	
t Value	.50		2.76		2.96	
Level of Significance	NS		.02		.01	

*Conducted by Merle B. Karnes

Description of the Five Intervention Programs Utilized at the Four-Year Level

1. A traditional nursery school program for disadvantaged children was established under the administration of the research director. A major goal of the program was to foster the acquisition of social skills. Teachers were instructed to capitalize on opportunities for incidental and informal learning.

2. The Karnes' program for the amelioration of learning deficits is highly structured and based on psychological theories. Activities which employ a game format and stress motor-sensory manipulation are carefully programmed to help the disadvantaged child overcome specific deficits in learning as well as in basic motivation and to accelerate his development in areas which will enable him to cope more successfully with later school tasks. The curriculum is designed to develop the basic language processes as well as to teach specific content in the areas of mathematics, language arts, social studies and science. Since language is the area of greatest weakness among these children, the development of language skills was a basic goal throughout the curriculum.

3. The Bereiter-Engelmann direct verbal approach is also a highly structured program and represents a sharp break with the child development tradition. The educational program is derived from an analysis of material to be learned rather than from an analysis of the children or from psychological principles. The program consists of sessions of intensive direct verbal instruction in language, reading, and arithmetic. Direct verbal interaction is the primary teaching strategy. For a detailed account of this program I refer you to Teaching Disadvantaged Children in the Preschool, by Carl Bereiter and Siegfried Engelmann, published by Prentice Hall in 1966.

4. The Montessori program was administered by the local society and employed a qualified Montessori teacher. The classroom was well equipped with approved Montessori materials.

5. The community integrated program provided a traditional nursery school program at four neighborhood centers. These centers were licensed by the state and were sponsored by community groups. Professional preschool teachers were employed. These classes were composed predominantly of middle class children; two or three disadvantaged children attended each session.